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Effect of different weed management practices on weed dynamics of blackgram in Northeast India

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Abstract
During the *kharif* season 2022, a field experiment was carried out at the College of Agriculture, Central Agricultural University, Imphal, Manipur. The experiment consisted of 8 treatments i.e. T_1 (hand weeding at 20 and 40 DAS), T_2 (rice husk @ 10 t/ha), T_3 (pendimethalin @ 1 kg/ha), T_4 (imazethapyr @ 0.07 kg/ha), T_5 (imazethapyr @ 0.08 kg/ha), T_6 (pendimethalin @ 1 kg/ha *fb* imazethapyr @ 0.07 kg/ha), T_7 (pendimethalin @ 1 kg/ha *fb* imazethapyr @ 0.08 kg/ha), T_8 (weedy check/control) was laid out in randomized block design replicated thrice. Blackgram variety Pant U31 was sown with the spacing 30 cm x 15 cm utilizing 20 kg of seed per hectare fertilized with the recommended dose of $N:P_2O_5:K_2O$ i.e. 20:40:20 kg per hectare. The treatment pendimethalin @ 1 kg/ha *fb* imazethapyr @ 0.08 kg/ha followed by treatment T_1 (hand weeding at 20 and 40 DAS) which was statistically on par with each other were found out to be most effective weed management practices for blackgram in respect of obtaining the lowest weed count/m^2, highest WCE as well as lowest fresh and dry weight of the weeds.

Keywords: Blackgram, weed, hand weeding, pendimethalin, imazethapyr

Introduction

India is the world's largest producer, consumer, importer, and producer of pulses by area. About 20% of the area planted with food grains is dedicated to growing pulses, which produce 7-10 percent of the nation's total grain production. Pulses contain protein ranging from 17 to 27 percent. The amount of pulses produced falls considerably short of what is needed to even reach the very minimal level of per capita consumption. Contrary to FAO/WHO recommendations, which call for 104 g of pulses per person per day, the availability of pulses per person is just 45 g. Meeting the country's growing population's demand for pulses is therefore a significant challenge for agricultural scientists. Pulses as a leguminous crop, can fix and use atmospheric nitrogen besides helping to increase the fertility of soil. The total production of pulses in India during the past 15 years has impressively increased from 13.38 million MT in 2005-2006 to 25.58 million MT in 2020-2021 (Anon., 2020-2021) [3]. Production of blackgram has primarily been spread in tropical and subtropical countries. In India, it is grown during the *kharif*, *rabi*, and summer seasons. Infestation of the weed is the main reason for the reduction of the yield (i.e. low productivity of the crop) of blackgram grown during the *kharif* season. Weed losses are more than the entire yearly losses of agricultural products due to several categories such insects, illnesses, other pests, nematodes, etc. In general, the yield of the crops is reduced due to the presence of weeds around 31.5% i.e. 22.7% in the winter season and 36.5% in the summer and *kharif* season and sometimes it also causes complete devastation of the crop in India (Anon., 2007) [2]. Weeds usually compete with the crops in terms of nutrients, moisture and light thus, deplete crops environment of nutrients, waters, and light. During the growth period of the crop, if it receives frequent rainfall along with high temperature the weeds infest the crop growth heavily that leads in lowering the productivity of the crop. Against weed blackgram is not a good competitor at the early stages of the crop growth (Choudhary *et al.*, 2012) [5]. Weeds can be controlled by cultural, manual, biological, mechanical and chemical methods. In blackgram physical methods or the mechanical methods are the traditional method to control the weeds. Manual weeding is required to keep the crop weed-free, but due to time consumption, labour intensive as well as increasing labour crisis it requires other possible alternatives to control the weed population. Herbicides can be used to control weeds as an alternative to other weed management techniques. A single herbicide application might not be sufficient for broad-spectrum weed control instead application of pre- and post-emergence herbicide in sequence, mix or integrated with hand weeding's possibly a better option than single application. Application of a post-emergence herbicide is a suitable alternative to control the 2nd weed flush in pulses since it also minimizes the need for human labor. (Singh *et al*., 2014) [11]. In light of these circumstances, the current study analyzed the effects of different weed management practices in order to determine the best performing course of action.

Materials and Methods

During the *kharif* season 2022**,** a field experiment was carried out at the College of Agriculture, Central Agricultural University, Imphal, Manipur. The experimental site is located 774.5 meters above mean sea level at latitude 24º45' N and longitude 93º54' E. The texture of the experimental soil was clay with sand 9.28%, silt 24.72% and clay 66%, highly acidic (pH 5.25), high organic carbon content with 1.11%, low available nitrogen content (263.42 kg/ha), low phosphorus content (20.82 kg/ha) and medium potassium content (232.31 kg/ha). The minimum and maximum temperatures that were logged while the crops were growing The temperatures (highest and lowest points) that were logged during the period of crop growth under review were 22.80 °C and 30.05 °C respectively with an average rainfall of 157.00 mm and average sunshine hours of 4.58 hrs. With eight treatments and three replications, the experiment was set out using randomized block design. The treatments were: T_1 (hand weeding at 20 and 40 DAS), T_2 (rice husk@10 t/ha), T_3 (pendimethalin @ 1 kg/ha), T_4 (imazethapyr @ 0.07 kg/ha), T_5 (imazethapyr @ 0.08 kg/ha), T_6 (pendimethalin @ 1 kg/ha *fb* imazethapyr @ 0.07 kg/ha), T_7 (pendimethalin @ 1 kg/ha *fb* imazethapyr @ 0.08 kg/ha), T_8 (weedy check). The blackgram variety Pant U31 was sown on 16th June 2022 with the spacing of 30cm x15cm using seed rate of 20kg/ha, the recommended fertilizer dose used was 20:40:20 $N:P_2O_5:K_2O$ kg/ha respectively. The requisite amount of spray solution was sprayed with the help of hand sprayer. The quantity of water used was 500 litres/ha. Pendimethalin was applied as per-emergence (two DAS) and imazethapyr as post-emergence (nineteen DAS). Using a *khurpi*, hand weeding was carried out manually at 20 and 40 DAS as per specific treatment schedule. A quadrate of 0.25 square meters was used to measure the number of weeds in a confined area, randomly selected in each individual plot and converted into weed count per m^2. The weeds removed from the quadrate at 20, 40 and 60 DAS were cleaned, washed and weighed fresh weight of the weeds afterwards the weeds were weighed and expressed in g/m^2 as their dry weight after being placed in the oven for 72 hours at 60 °C. Using the formula suggested by Mani *et al*. (1973), weed control efficiency (%) was calculated.

$$WCE\ (\%) = \frac{DWC - DWT}{DWC} \times 100$$

Where, D.W.C is the dry weight of weeds in control and D.W.T is the dry weight of weeds in treated plots. The analysis of variance technique described by Gomez and Gomez (1984) [6] were used to compute the data obtained on the experiment. Square root transformation $(x+0.5)^{1/2}$ was applied to the data that displayed a high degree of variation, whenever the treatment differences were significant, for the comparison of the treatment critical difference at five percent probability level were worked out. While the non-significant were represented as NS.

Results and Discussion

Weed parameters

Weed flora

The predominant weed flora found in the experimental field during the *kharif* season 2022 was composed of sixteen species, belonging to eight different families. The dominant weeds were *Echinochloa colona*, *Digitaria sanguinalis*, *Cynodon dactylon*, *Galinsoga parviflora*, *Bidens pilosa*, *Euphorbia hirta*, *Spilanthes paniculata* (Table 1). Similar weed flora was also noticed by Jagadesh *et al*. (2019). Among which poaceae family weeds were dominated in the monocot weeds and asteraceae family weeds were dominated in the dicot weeds.

Table 1: Weed flora of blackgram field during the experimental season

Category	Sl. No.	Scientific name	Common name	Family
Monocot weed	1	*Echinochloa colona*	Jungle rice	Poaceae
	2	*Digitaria sanguinalis*	Hairy crabgrass	Poaceae
	3	*Juncus tenuis*	Path rush	Juncaceae
	4	*Juncus articulatus*	Jointleaf rush	Juncaceae
	5	*Setaria parviflora*	Marsh bristlegrass	Poaceae
	6	*Cynodon dactylon*	Bermuda grass	Poaceae
	7	*Cyperus rotundus*	Purple nutsedge	Cyperaceae
	8	*Sphenopholis obtusata*	Prairie wedge grass	Poaceae
Dicot weed	9	*Galinsoga parviflora*	Gallant soldier	Asteracea
	10	*Cardamine hirsuta*	Hairy bittercress	Brassicaceae
	11	*Crassocephalum crepidioides*	Fireweed	Asteracea
	12	*Euphorbia hirta*	Asthma weed	Euphorbiaceae
	13	*Bidens pilosa*	Black jack	Asteracea
	14	*Ludwigia prostrata*	heusenkraut	Onagraceae
	15	*Aeschynomene indica*	Indian jointvetch	Leguminoceae
	16	*Spilanthes paniculata*	Toothache plant	Asteracea

Weed count/m²

The total weed count/m² reduced acutely at all crop growth stages under various treatments (except 20 DAS) in comparison to weedy check. Analogous results were obtained by Yadav *et al*. (2014) [12], who concluded in comparison with weedy check the weed control techniques significantly reduce the weeds population in blackgram. Significantly, the lowest monocot weed count/m² was recorded under the treatment T_7 at 20, 40 and 60 DAS *fb* T_1 (Table 2). Regarding the dicot weed count/m² at 20, 40 and 60 DAS lowest was recorded under the treatment T_7 which was statistically comparable with the value T_6 at 20 DAS. At 40 DAS and 60 DAS it was found to be on par with T_1. And significantly the lowest total weed count/m² were recorded under T_7 at 20, 40 and 60 DAS which was on par with T_1 except at 20 DAS, while the highest was noted under weedy check at all the stages except at 20 DAS which was on par with T_1 the trend follows the same for dicot as well as monocot. Identical set of results was also discovered by Balyan *et al*. (2016) [4].

Table 2: Effect of weed management practices on weed count/m² in blackgram

Treatments	Monocot weed count/m²			Dicot weed count/m²			Total weed count/m²		
	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS
T_1	20.33 (4.56)*	13.33 (3.72)*	16.33 (4.10)*	22.67 (4.81)*	12.33 (3.59)*	16.33 (4.10)*	43.00	25.67	32.67
T_2	18.33 (4.34)*	28.33 (5.37)*	39.67 (6.34)*	16.00 (4.06)*	36.00 (6.04)*	41.33 (6.47)*	34.00	64.33	81.00
T_3	18.67 (4.38)*	26.33 (5.18)*	33.00 (5.79)*	13.67 (3.76)*	28.00 (5.34)*	37.33 (6.15)*	32.33	54.33	70.33
T_4	18.33 (4.34)*	22.67 (4.81)*	28.00 (5.33)*	17.00 (4.18)*	24.33 (4.98)*	37.00 (6.12)*	35.33	47.00	66.00
T_5	16.33 (4.10)*	22.33 (4.78)*	27.67 (5.31)*	16.67 (4.14)*	22.33 (4.78)*	35.33 (5.99)*	33.00	44.67	63.00
T_6	14.00 (3.81)*	13.67 (3.76)*	17.67 (4.26)*	13.00 (3.67)*	15.33 (3.98)*	18.67 (4.38)*	27.00	29.00	36.33
T_7	11.00 (3.38)*	12.00 (3.53)*	14.67 (3.89)*	11.67 (3.49)*	12.33 (3.58)*	16.33 (4.10)*	22.67	24.33	31.00
T_8	21.33 (4.67)*	41.67 (6.49)*	44.33 (6.69)*	22.67 (4.81)*	42.33 (6.54)*	44.67 (6.72)*	44.00	84.00	89.00
SEd (±)	0.75 (0.10)*	0.54 (0.06) *	0.67 (0.07)*	0.82 (0.11)*	0.58 (0.06)*	0.60 (0.05)*	1.25	0.79	0.94
C.D 5%	1.59 (0.22)*	1.15 (0.13) *	1.46 (0.15)*	1.77 (0.23)*	1.23 (0.13)*	1.29 (0.12)*	2.68	1.7	2.03

(*- The values in the parenthesis are square root transformed)

Fresh and dry weight of weed (g/m²)

All the treatments remarkably lessened the fresh and dry weight of the weeds over weedy check. Among the treatments, minimum fresh and dry weight of weed was recorded with the treatment T_7 at 20, 40 and 60 DAS, which was discovered to be on par with T_1 at 40 and 60 DAS (Table 3). However, at 20 DAS T_7 was found on par with T_6 for fresh weight and T_3 for dry weight of the weed. Under weedy check, the maximum fresh and dry weight of the weed was reported at 20, 40 and 60 DAS. The same outcomes were likewise attained by Ali *et al*. (2011) [1] and Painkra *et al*. (2021) [9]. Data disclosed that different weed management practices controlled weeds effectively in comparision with weedy check. At different period of the crop growth variation in weight of the weeds can be observed this was because of the effect of weed management practices as for herbicidal treatment the dose applied and the type of herbicide used leads to variation.

Table 3: Effect of weed management practices on fresh and dry weight of the weeds and WCE in blackgram

Treatments	Fresh weight of weed (g/m²)			Dry weight of weed (g/m²)			WCE (%)		
	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS
T_1	20.72	19.56	28.32	5.35	4.35	10.34	4.91	86.24	85.11
T_2	7.63	36.17	89.34	2.95	18.27	41.73	47.66	42.15	39.92
T_3	6.54	31.50	75.43	1.15	10.12	29.42	79.57	67.95	57.64
T_4	8.36	28.36	57.32	2.83	9.11	25.37	49.73	71.16	63.47
T_5	6.78	25.67	53.52	2.00	7.38	20.52	64.41	76.62	70.45
T_6	6.09	23.68	34.45	1.88	5.74	13.53	66.65	81.82	80.51
T_7	5.54	19.43	29.20	1.04	4.14	10.73	81.58	86.88	84.54
T_8	22.15	65.09	112.46	5.63	31.59	69.45	0	0	0
SEd (±)	0.39	0.29	0.11	0.03	0.10	0.19	0.59	0.32	0.27
C.D 5%	0.83	0.62	0.25	0.07	0.22	0.42	1.25	0.69	0.58

Weed control efficiency

The treatment T_7 recorded the highest value of WCE at 20, 40 and 60 DAS (81.58%, 86.88% and 84.54%) which was statistically at par with T_1 at 40 and 60 DAS (86.24% and 85.11%) and the next superior treatment was T_3 (79.57%) and T_6 (81.82%) respectively at 20 and 40 DAS (Table 3). Lowest value was observed under rice husk @ 10 t/ha at 40 and 60 DAS (42.15% and 39.92%). The highest value of WCE may have resulted from a reduction in weed spectrum during the early stages of crop growth period that results in reduction of biomass of weed. Analogous findings were reported by Rai *et al*. (2016) [10] and Painkra *et al*. (2021) [9].

Conclusion

Considering the aforementioned results it could be resolved that the treatment T_7 followed by treatment T_1 which did not differ from each other were observed to be most effective weed management practices for blackgram in respect of obtaining the lowest weed count/m^2, highest WCE as well as lowest fresh and dry weight of the weeds.

References

1. Ali S, Patel JC, Desai LJ, Singh J. Effect of herbicides on weeds and yield of rainy season green gram (*Vigna radiata* L. Wilczek). Legum. Res. 2011;34(4):300-303.
2. Anonymous. Vision 2025. NRCWS Perspective Plan. Indian Council of Agricultural Research (ICAR), New Delhi, India. 2007.
3. Anonymous. A Brief Handbook, Directorate of Pulses Development, Government of India, Bhopal; c2020-2021.
4. Balyan JK, Choudhary RS, Kumpawat BS, Choudhary R. Weed management in blackgram under rainfed conditions. Indian J Weed Sci. 2016;48(2):173-177.
5. Choudhary VK, Kumar PS, Bhagawati R. Integrated weed management in blackgram (*Vigna mungo*) under mid hills of Arunachal Pradesh. Indian J Agron. 2012;57(4):382-385.
6. Gomez KA, Gomez AA. Statistical Procedures for Agricultural Research. 2nd edn., John Wiley and Sons, New York; c1984.
7. Jagadesh M, Raju M, Rahale CS. Influence of different weed management practices on growth and yield attributes of irrigated blackgram under Cauvery delta zone of Tamil Nadu. J Pharmacogn. Phytochem. 2019;8(3):608-611.
8. Mani VS, Pandita ML, Gautam KC, Das B. Weed killing chemicals in potato cultivation. Proc. Natl. Acad. Sci. U.S.A. 1973;23:17-18.
9. Painkra D, Gupta DK, Sinha AK, Paliwal AK, Chouksey N, Singh SK. Effective weed management strategy for blackgram (*Vigna mungo* L. Hepper) under north hill situation of Chattisgarh. Pharma Innov. 2021;10(7):85-88.
10. Rai CL, Sirothia P, Tiwari R, Panday S. Weed dynamics and productivity of blackgram (*Vigna mungo* L.) as influenced by pre and post emergence herbicides. Res. Crops. 2016;17(1):58-62.
11. Singh RP, Verma SK, Singh RK, Idnani LK. Influence of sowing dates and weed management on weed growth and nutrients depletion by weeds and uptake by chickpea (*Cicer arietinum*) under rainfed condition. Indian J. Agric. Sci. 2014;84(4):468-472.
12. Yadav SC, Singh UP, Padmavati J, Kumar SS, Singh L, Singh H. Influence of weed management practices in blackgram under guava based agri-horti system in Vindhyan region. Biennial Conference of Indian Society of Weed Science on Emerging Challenges of Weed Management, DWSR, Jabalpur; c2014. p. 149.

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